APPLICATION

Determining Coil Diameter Automatically

Multiple measuring points are required for automated production lines in order to ensure an error-free process. A critical measuring point is the current diameter of coils. This information is either required for regulating production speed or as a criterion for determining when the strip end is approaching. Different measuring systems are used for this application. An optical system operates very reliably and can provide distance measurements of other parameters, not only on the coils.

Coils are frequently used to store and transport products in metalworking environments. The coil diameters change constantly during the unwinding process. In order to enable continuous production, the ends of the coils are often welded together. However for this, it must be established when the end of the coil is approaching during the unrolling process. The remaining length of the metal track on the coil can be measured accurately by taking diameter measurements, which enables automatic coil changes to take place if required.

Measuring in Metres

As coil diameters can reach up to 3 m, sensors are required that have a measuring range between 0.1 m and 3 m. Laser distance sensors in Micro-Epsilon's optoNCDT ILR series are suitable for this.

These sensors can measure distances up to 150 m and are frequently used in logistics, cranes and other diameter measurement applications.

The optoNCDT ILR 118x sensors operate according to the phase comparison principle and so are significantly more accurate than conventional sensors that operate using the 'time of flight' principle.

The phase comparison principle measures distances using a high frequency modulated Class II laser source. Signals with small amplitude and constant frequency are transmitted to the target. Depending on the distance from the object, the displacement changes the phase relationship between the transmitted and received signal. A comparison of the emitted light with the received laser light therefore enables the exact distance to the target to be established. Accuracies to 0.1 mm can be achieved via this method. It is important that the surface of the target is sufficiently reflective. In the case of insufficient reflection, a special reflector plate can be provided.

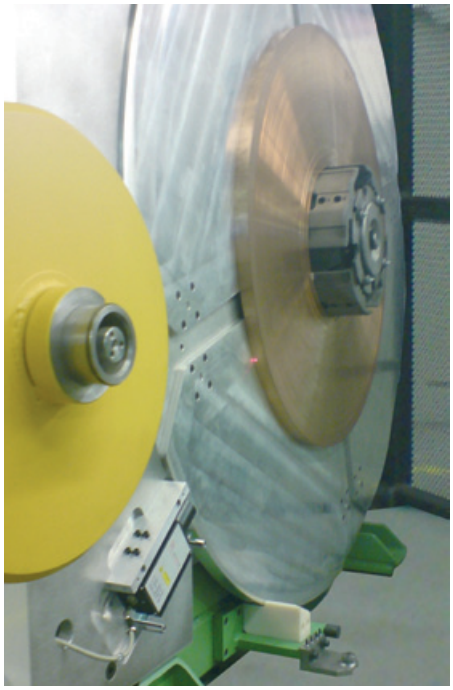
Measuring Optically on Coils

Mounted on the coiler, the sensor measures directly onto the surface of the coil. Conventional optical sensors are adversely affected by the shiny surface of many metal coils. The laser light on the surface of the coil is reflected past the sensor due to direct reflection effects. This results in distorted measurement s or disproportionately large noise, which makes the results unusable. One benefit of the optical measuring principle is that various filters can be placed in front of the lens in order to upgrade or smooth out the signal.

Using a suitable measurement set up, measurements on shiny metals can be carried out using optoNCDT ILR sensors. For these sensors, the low inten-

▲ Measuring the diameter of the coil enables the automatic change of the coil in automated production lines.

▲ MEMA's respooling machine



▲ Finished coils are produced in a respooling machine from individual ring-shaped metal bands.

sity of the diffusely reflected portion during direct reflection of the laser light is sufficient to determine the precise distance. The sensor is designed for industrial use. As well as having slot screws for easier mounting, the sensor also has a wide range of configuration options, including air purge units and protective housings.

Drive Controller in Precision Respooling Machines

Mechanical engineering company MEMA from Menden produces, among other things, respooling machines for metal strips.

Finished coils are produced in the respooling machine from individual ring-shaped metal bands. The metal rings are joined together coil by coil so that one continuous coil is produced. The machine is used for copper, steel or composite material strips. Mr. Bernd Hostert, Project Manager at MEMA states: »We decided to use optical sensors from Micro-Epsilon due to their accuracy. Using these sensors, we can now reliably determine the remaining amount of coil on the rings.«

When the drive spool is accelerated towards its optimum laying speed, the ring diameter at the decoiler drive must be determined in order to ensure that both drive stations accelerate at the appropriate speed to maintain the tension of the strip. For this application, MEMA uses the optoNCDT ILR 1181-30 sensor. This sensor reliably measures on very shiny or matt surfaces with a width of between 5 mm and 60 mm. The strip reaches speeds of up to 500 m/min.

In metalworking, other applications for laser distance sensors include the measurement of loops in cold and hot rolling lines. These loops are necessary in order to check the stresses in the rolled material and to enable regulation of the decoiling and control of the pull-off speed. The changing depth of the loop is also measured using optoNCDT ILR sensors. In addition to measuring metal target objects, applications now also include paper rolls and opaque film.

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